Math 361 **Numerical Analysis**
8/29/19 Quiz 2

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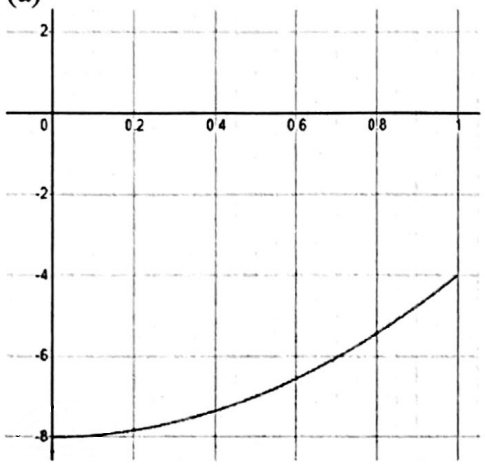
Name

Answer the following questions in the space provided. **Show all work.** (35 pts. total.)

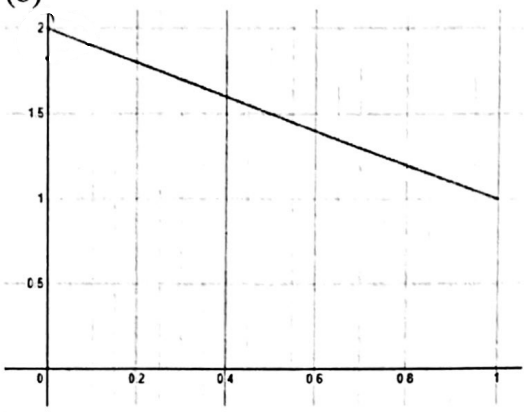
1. Use the graphs of the functions f below to find $\max_{0\le x\le 1}|f(x)|$ for each. (3 pts. each)

(a)



$\max_{0\le x\le 1}|f(x)| = 8$

(b)



$\max_{0\le x\le 1}|f(x)| = 2$

2. Circle the symbolically correct version of the remainder term $R_n(x)$ for the n-th Taylor polynomial $P_n(x)$. (5 pts)

(a) $R_n(x) = \frac{f^{(n)}(\xi(x))}{n!}(x-x_0)^n$

(b) $R_n(x) = \frac{f^{(n+1)}(\xi(x))}{(n+1)!}(x-x_0)^{n+1}$

(c) $R_n(x) = \frac{f^{(n+1)}(\xi)}{(n+1)!}(x-x_0)^{n+1}$

(d) $R_n(x) = \frac{f^{(n)}(\xi(x))}{n!}x^n$

3. For the remainder term $R_n(x)$ for the n-th Taylor polynomial $P_n(x)$, answer the following. (2 pts. each)

(a) True or False (Circle one): It is generally the case that $f^{(n+1)}(\xi(x)) = f^{(n+1)}(x)$. False

(b) True or False(Circle one): $\xi(x)$ is a number between x_0 and x. True

5. Let $f(x) = 6\cos(x)$.

(a) Find the second Taylor polynomial $P_2(x)$ about $x_0 = 0$. (10 pts.)

$P_n(x) = \sum_{n=0}^{\infty} \frac{f^{(n)}(x_0)}{n!}(x-x_0)^n$

$f^0(0) = 6\cdot\cos(0) = 6$ $\qquad$ $f'''(x) = 6\cdot\sin(x)$: $f'''(0) = 6\cdot\sin(0) = 0$

$f'(x) = -6\cdot\sin(x)$: $f'(0) = -6\cdot\sin(0) = 0$

$f''(x) = -6\cdot\cos(x)$: $f''(0) = -6\cdot\cos(0) = -6$

$P_2(x) = 6 - \frac{6x^2}{2} = 6 - 3x^2$ $\qquad$ $\boxed{P_2(x) = 6 - 3x^2}$

(b) Using the methods covered in class, find an upper bound for $|R_2(0.3)|$. Be sure to show your steps in deriving your upper bound. (10 pts.)